

STATE OF SOUTH CAROLINA
BEFORE THE PUBLIC SERVICE COMMISSION
DOCKET NO. 2018-255-E

In the Matter of:)	
)	
Application of Duke Energy)	COMMENTS OF SOUTH CAROLINA
Progress, LLC for Approval of)	COASTAL CONSERVATION
Rider 10)	LEAGUE AND SOUTHERN
)	ALLIANCE FOR CLEAN ENERGY
)	

The South Carolina Coastal Conservation League (“CCL”) and Southern Alliance for Clean Energy (“SACE”) (collectively, “Efficiency Intervenors”) hereby submit the following comments on Duke Energy Progress, LLC’s (“DEP” or “the Company”) application for approval of its demand-side management (“DSM”) and energy efficiency (“EE”) rider for 2019 (“Rider 10”).¹ DEP seeks to recover, through its proposed Rider 10, certain costs, lost revenues, and incentives, including net lost revenues and program/portfolio performance incentives (“PPI”) as applicable, associated with its DSM and EE programs allocated jurisdictionally to South Carolina.

INTRODUCTION

CCL and SACE generally support the application for approval of DEP’s Rider 10, but are discouraged that DEP has failed to achieve its energy savings target.² The Company’s DSM/EE portfolio achieved savings of 0.87% of prior-year retail sales in

¹ The proposed Rider 10 consists of components calculated under DEP’s cost-recovery and incentive mechanism approved in Docket No. 2015-163-E.

² The Merger Settlement with SACE, South Carolina Coastal Conservation League, and Environmental Defense Fund calls for annual energy savings of at least 1% of prior-year retail sales beginning in 2015 and cumulative savings of at least 7% over the period from 2014 through 2018. The Merger Settlement was approved by the Public Service Commission of South Carolina (“PSCSC”) in Docket No. 2011-158-E.

2017, essentially unchanged from its 2016 energy savings of 0.85%.³ Furthermore, DEP projects that energy savings will continue to fall short of its target. Although DEP has maintained a cost-effective portfolio, it has underutilized opportunities to increase energy savings and reduce energy costs for its customers.

Overall, DEP is not on track to meet the annual or cumulative savings targets that it agreed to in connection with the Duke Energy-Progress Energy merger; further, the gap between the portfolio's energy savings and the merger targets are not projected to close. Considering this, DEP should investigate and implement program improvements and increase the savings that participants achieve. Petitioners' comments will discuss the following topics:

- 1) The Company's portfolio of conservation and demand-side management programs remain very cost-effective, saving DEP's South Carolina customers money that would otherwise have been spent on more expensive supply resources. The Company is not, however, accounting for all customer and system benefits in its cost-effectiveness calculations, falling short of best-practices and leading to underestimates of the cost-effectiveness of its program offerings. A Technical Resource Manual, or TRM, would aid the Commission, the Office of Regulatory Staff, and intervenors in the review of the DEP's savings and net benefits claims going forward.

³ In its application, DEP reported 416.3 gigawatt hours ("GWh") of total system savings at the generator from 2017 in both North and South Carolina from its approved DSM and EE programs. Approximately 14.49% of those savings, or 60.3 GWh, are allocated to South Carolina. DEP Application, Exhibit 7. Accounting for 5.1% average line loss, that comes out to 57.4 GWh at the customer meter. DEP response to SACE data request 1-9. DEP reported 6,620 GWh of total retail sales in South Carolina in 2016, resulting in 0.87% savings in 2017 from prior-year retail sales. DEP Rider 10 Application, Exhibit 5 ("DEP Application").

- 2) Projected savings continue to be below the target 1.0% of total sales agreed upon in the then-proposed merger of Duke Energy and Progress Energy (“Merger Settlement”).
- 3) The Company’s energy savings rely too heavily upon lighting and behavioral programs, largely missing opportunities for comprehensive home and commercial building performance improvements and high-efficiency industrial systems. In addition, DEP is likely overstating the lifetime savings and future net benefits of its lighting measures, given new federal efficiency standards for light bulbs that are scheduled to go into effect in 2020. The Company may also be significantly over-estimating the new savings achieved from the My Home Energy Report program, its chief residential behavior program, by not taking into account persistence of savings for some time after participants stop receiving the Report.
- 4) There is significant untapped efficiency potential in DEP’s service territory that its existing programs are not reaching. In particular, there is inadequate promotion of longer-lived major measures or comprehensive treatment of buildings. The Residential Smart \$aver Energy-Efficiency Program, through which DEP promotes major measures such as heat pumps, central air conditioners, heat pump water heaters, attic insulation, and duct sealing, is forecast to produce only about 1% of its total savings in the residential sector. In addition, there is a strong need for increased investment in lower-income communities and in programs that reach rental units.

- 5) The already high rate of commercial and industrial customers opting out of DEP's DSM/EE programs and riders continues in 2017, hampering potential savings in these energy-intensive sectors.
- 6) DEP needs to increase its investments in lower-income communities.

The following comments review the performance of DEP's DSM/EE portfolio, address the above concerns, and provide recommendations designed to increase DEP's achievement of cost-effective energy savings in future years. Petitioners are eager to continue to work with DEP, the South Carolina Office of Regulatory Staff, and other stakeholders in a collaborative process to implement these recommendations and ensure that the Company's programs continue to save energy and money for South Carolinians. To this end, we also recommend ways to improve the combined DEP-DEC Collaborative for both North and South Carolina so as to increase opportunities for working through these issues in between Public Service Commission (and North Carolina Utility Commission) DSM/EE dockets.

A. DEP's DSM/EE portfolio remains cost-effective and broad, but the Company's evaluations underestimate the overall cost-effectiveness of its programs by failing to take into account all relevant benefits based on national best practices.

i. DEP's Portfolio is Very Cost-Effective, saving its South Carolina customers money

There are admirable aspects of the Company's DSM/EE portfolio. Foremost, the portfolio is very-cost effective, demonstrating that efficiency programs are a least-cost resource for meeting the energy needs of consumers. Between 2015 and 2017, the Company's efficiency programs provided enough peak demand savings to eliminate the

need for about two and a half natural gas “peaker” power plants.⁴ By definition, “cost-effective” means that the benefits (that is, the avoided cost savings) of the programs exceed the costs. DEP’s DSM/EE portfolio has been cost-effective and remains so.

The Company reported its highest ever net system benefits from its DSM/EE programs in 2017—\$201.55 million—demonstrating significant benefits to ratepayers.

Table 1, Net System Cost-Savings of DEP’s Programs (Net Benefits in \$M)⁵

Program	2015	2016	2017	2019
Energy Education Program for Schools	\$0.32	\$0.24	\$0.54	\$0.40
Energy Efficient Lighting	\$21.30	\$18.38	\$18.43	\$8.15
Home Energy Improvement Program	\$1.56	\$0.97	(\$0.65)	(\$0.56)
Multi-Family	\$6.45	\$4.78	\$7.72	\$5.01
Neighborhood Energy Saver	(\$0.45)	(\$0.87)	(\$0.66)	(\$1.15)
Residential Energy Assessments	-	\$2.38	\$2.44	\$0.52
Residential New Construction	\$2.73	\$11.89	\$12.91	\$10.79
Save Energy and Water Kit	-	\$9.24	\$16.30	\$16.41
My Home Energy Report	\$1.92	\$4.74	\$0.22	(\$0.76)
EnergyWise	\$27.41	\$64.05	\$56.46	\$43.38
Energy Efficiency for Business	\$23.68	\$33.62	\$57.22	\$20.38
Non-Residential Lighting Program	\$9.78	\$8.95	\$7.87	\$4.82
Small Business Energy Saver	\$15.46	\$23.78	\$20.51	\$13.10
EnergyWise for Business	(\$0.06)	(\$0.30)	(\$0.09)	(\$0.78)
CIG Demand Response	\$0.46	(\$10.68)	\$2.15	\$6.47
Full Portfolio	\$110.78	\$171.62	\$201.55	\$126.18

⁴ The sum of the incremental annual peak savings for each year for all DEP’s efficiency programs other than the My Home Energy Report Program is 132 MW. Since virtually all of the savings from those programs are likely to have a life of at least three years, that is a reasonable estimate of the persisting peak savings after three years. On top of that, the My Home Energy Report Program has a peak savings of 20 MW in 2017 (since this is a program that is estimated to have just one-year life, we only include the peak savings from 2017), bringing the total for the efficiency program portfolio to 152 MW by the end of 2017. Note that this analysis is for efficiency programs only; the peak savings from DEP’ demand-response programs are additional to that amount. According to U.S. Energy Information Administration data (Form EIA-860Dat-Schedule 3, ‘Generator Data’ (Proposed Units Only)), in 2016 DEP had 2 proposed natural-gas-fired combustion turbines, each with a Summer capacity of 60.5 MW.

⁵ For 2017 & 2019, figures calculated from Evans Ex. 1, NCUC Docket No. E-2, Sub 1174; 2015-2016 as reported in SACE & CCL comments to PSC in Docket 2017-245-E. Net system benefits were calculated by subtracting the program costs from the net-present value of system benefits as reported by DEP.

CCL and SACE support the energy savings and system-cost reductions that have been achieved by the Company's programs; however, sound utility management and regulatory practice require expansion of programs that reduce costs and help all ratepayers lower their bills. As noted in our comments last year, DEP's most recent DSM potential study⁶ demonstrated the availability of cost-effective energy savings at a level higher than the agreed-to 1% annual savings target.

Further, DEP's efficiency program portfolio is relatively broad and promotes a wide range of energy efficiency measures that could at least theoretically be accessed by a wide range of residential and non-residential customers. We commend the Company for initiating a new midstream channel to its Non-Residential SmartSaver Prescriptive program to promote a range of efficient products to non-residential customers including HVAC, lighting, food service and IT measures. We are impressed by this national state-of-the-art practice that the Company has put into effect.

A comparison of savings achieved in 2016 and 2017 (Table 2) show some promising trends. For example, in its residential offerings, DEP has achieved significantly more savings from most of its key offerings, including its multifamily program and Neighborhood Energy Saver program. While its comprehensive home retrofit program, the Home Energy Improvement Program, has not yet achieved a positive cost-effectiveness score see (Table 3), DEP has shown an approximate 10% increase over 2016 in savings from this important program.

⁶ Nexant, Duke Energy South Carolina DSM Market Potential Study (Dec. 19, 2016) ("Nexant Study").

On the non-residential side, the Company has shown impressive savings improvements from its Energy Efficiency for Business and EnergyWise for Business programs, demonstrating that there is more room for improvement if the Company can reduce the number of opt outs going forward.

Table 2. DEC EE Program Energy Savings in 2016 and 2017⁷

	2016 Savings (GWh)	2017 Savings (GWh)	Percent Change	2017 % of Portfolio (excluding DSDR)
Residential Programs				
Appliance Recycling Program	0.21	0	-100.0%	
Energy Education Program for Schools	2.55	2.35	-7.8%	0.6%
Energy Efficient Lighting	41.65	29.91	-28.2%	7.9%
Home Energy Improvement Program	6.29	7.36	17.0%	1.9%
Multi-Family	12.46	16.15	29.6%	4.2%
Neighborhood Energy Saver	1.99	2.2	10.6%	0.6%
Residential Energy Assessments	4.14	5.45	31.6%	1.4%
Residential New Construction	10.96	13.99	27.6%	3.7%
Save Energy and Water Kit	17.67	25	41.5%	6.6%
My Home Energy Report	102.92	117.85	14.5%	31.0%
Residential Total	200.85	220.29	9.7%	57.9%
Business Energy Report	4.55			
Energy Efficiency for Business	71.15	103.1	44.9%	27.1%
Energy Efficient Lighting	12.18	7.88	-35.3%	2.1%
Non-Res SmartSaver		0.44	100.0%	0.1%
Small Business Energy Saver	49.98	48.04	-3.9%	12.6%
EnergyWise for Business	0.41	0.99	141.5%	0.3%
Non-Residential Total	138.27	160.44	16.0%	42.1%
DSDR	33.94	35.52	4.7%	
PORTFOLIO TOTAL	373.06	416.26	11.6%	

Figures are for total systems savings; ⁷ DEP Application, Exhibit 7 (South Carolina retail allocation factor is 14.5%).

- ii. *DEP is underestimating the cost-effectiveness of its programs by not accounting for all participant and system benefits*

The Company's key reported cost-effectiveness scores remain strong. But SACE and CCL are concerned that not all benefits are being accounted for accurately, effectively reducing the reported TRC and UCT scores.

Table 3, DEP's TRC and UCT Scores, 2016 & 2017⁸

Program	TRC 2016	TRC 2017	UCT 2016	UCT 2017
Residential Programs				
Energy Education Program for Schools	2.97	2.36	2.16	1.72
EnergyWise Home	50.62	51.46	10.29	9.68
Home Energy Improvement	0.64	0.48	1.23	0.95
Neighborhood Energy Saver	1.58	2.13	0.60	0.66
Multi-Family Energy Efficiency Program	5.78	7.10	3.70	4.26
My Home Energy Report	1.35	1.08	1.35	1.08
Residential Energy Assessments	3.27	2.75	2.78	2.42
Residential New Construction	1.44	1.27	2.37	2.20
Energy Efficient Lighting	4.36	2.38	2.31	2.81
Save Energy and Water Kit	51.94	75.82	21.73	20.23
Residential Total	3.80	2.89	3.48	3.37
Non-Residential Programs				
Energy Efficiency for Business	1.54	1.46	3.57	3.80
Business Energy Report	4.70	0.04	4.70	0.04
Performance Incentive		1.10		2.39
CIG DRA		28.54		2.55
EnergyWise for Business	0.24	0.98	0.23	0.98
Energy Efficient Lighting	11.50	6.15	6.09	7.27
Small Business Energy Saver	2.30	2.15	3.73	3.49
Non-Residential Total	1.72	1.73	3.24	3.68
Overall Portfolio Total	2.73	2.24	3.40	3.50

Accurately identifying and quantifying the relevant costs and benefits, however, is crucial in determining cost-effectiveness. The portfolio as a whole is more cost effective than the Company estimates in both its UCT benefit-cost ratio, which assesses cost-

⁸ DEP response to SACE data request 1-1

effectiveness from the utility's perspective, and its TRC calculations, which assesses cost-effectiveness from the combined perspective of both the utility and efficiency program participants. For example, if the Company were to align its UCT estimation method with national best practices and take into consideration avoided ancillary service costs, avoided credit and collection costs, and the value of risk-mitigating benefits of efficiency, and adjust its estimated saving to account for marginal line-loss rates (which are much higher than average line-loss rates) rather than average line-loss rates, DEP's UCT estimates of benefits would likely increase by roughly 20%.⁹

For example, if the Company were to align its TRC estimation methods with the NSP Manual and take into consideration avoided gas costs for measures that save electricity and gas, avoided water consumption for electric efficiency measures that save electricity and water, and other non-energy participant benefits like improved business productivity, building durability, health, and safety, DEP's TRC estimates of benefits would likely increase by over 50%.¹⁰ Ensuring that these cost-effectiveness tests more fully capture all relevant benefits and costs will result in a more informed assessment of DEP's DSM/EE portfolio.

If all relevant avoided costs and categories of benefits were taken into account, we would have a more accurate picture of the cost-effectiveness of DEP's programs. Additionally, some of the individual programs that DEP is modifying may turn out to be worth maintaining to achieve maximum net benefits for DEP's customers.¹¹

⁹ Woolf, Tim et al., *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*, Edition 1, Spring 2017 (<https://nationalefficiencyscreening.org/national-standard-practice-manual/>) ("NSP Manual").

¹⁰ Direct Testimony of Chris Neme on behalf of SACE, NC Justice Center, NC Housing Coalition, and NRDC; NCUC Docket No. E-2, Sub 1174 (September 4, 2018), pp. 28-40.

¹¹ Id.

iii. *A Technical Reference Manual would aid in review of DEP's DSM/EE programs*

CCL and SACE recommend that the Public Service Commission order the development of a Technical Reference Manual (“TRM”). A TRM documents publicly all current assumptions regarding efficiency-measure energy savings, peak-demand savings, savings life, and incremental costs – as well as references for the sources of those assumptions. When evaluation studies indicate that an assumption needs to be updated, the TRM is also updated. The absence of such a single reference document makes it more difficult to review the reasonableness of DEP’s savings and net benefits claims.

The vast majority of states – especially those with fairly robust efficiency-program offerings – have TRMs. For example, in the South there are TRMs currently in use in Arkansas (currently on their seventh iteration),¹² New Orleans (currently on its first iteration),¹³ Texas (currently on its fifth iteration),¹⁴ and by TVA (currently on its seventh iteration).¹⁵ TRMs have also been developed and used by utilities in Illinois, Indiana, Michigan, Ohio, Pennsylvania, Missouri, New Jersey, other mid-Atlantic states, New York, the New England states, the Pacific Northwest states, California, and at least half a dozen other states.¹⁶ South Carolina, in cooperation with North Carolina, should follow suit.

A TRM would provide transparency regarding the basis for all utility-savings estimates, as well as other key inputs to cost-effectiveness calculations. That makes it

¹² <http://www.apscservices.info/EEInfo/TRMv7.0.pdf>.

¹³ No on-line link is available.

¹⁴ <http://www.texasefficiency.com/index.php/emv>.

¹⁵ <https://www.tva.gov/Energy/EnergyRightSolutions>.

¹⁶ For a list of jurisdictions with TRMs as of a year ago see U.S. Department of Energy, *SEE Action Guide for States: Guidance on Establishing and Maintaining Technical Reference Manuals for Energy Efficiency Measures*, Evaluation, Measurement and Verification Working Group, June 2017 (https://www4.eere.energy.gov/seeaction/system/files/documents/TRM%20Guide_Final_6.21.17.pdf).

easier for all parties to identify quickly when key assumptions may be outdated and/or when targeted evaluation activity may be needed to update assumptions. That includes assumptions, such as savings life and incremental cost, that are often not addressed by impact evaluations. Such assumptions are important inputs to cost-effectiveness calculations and shareholder-incentive calculations.

B. DEP's DSM/EE Portfolio Continues to Under-perform its Agreed-to Savings Target

Unfortunately, the overall performance of DEP's energy efficiency portfolio is still not on track to meet agreed-to savings targets. The projected first year savings for the 2019 portfolio are equal to 0.84% of sales. While substantial, this figure remains below the 1.00% annual target that the Company agreed to reach in the settlement agreement and is far below the 1.40% average annual savings that would have been required for the Company to reach a cumulative 7.00% savings over five years (2014 through 2018), which the Company also agreed to in the Merger Settlement. DEP's actual and projected savings lag significantly behind the targets that the Company agreed to in the Merger Settlement with SACE, CCL, and other intervenors.

Despite the slight improvement in energy savings in 2017 to 0.87% of prior-year retail sales, the Company projects a 7.6% decline in system-wide energy savings to only 384.7 GWh in 2019.¹⁷ This represents about 0.84% of its total annual projected retail sales and 1.21% of its retail sales to eligible customers (i.e. those that have not opt out of its programs).¹⁸ The Company is capable of achieving higher levels of energy efficiency

¹⁷ DEP Application, Exhibit 7, Vintage 2019 Estimate

¹⁸ The Company is forecasting that it will achieve 385 GW of total efficiency program savings at the generator in 2019. (Evans, Exhibit , p. 7). Approximately 85.56% of those savings - or 329 GWh - is allocated to North Carolina. Approximately 14.44% of those savings or - 56 GWh is - is allocated to South

savings in a cost-effective manner in 2019. The actual savings levels achieved by the Company in 2017 were higher than what DEP is proposing for 2019; and the 2017 program portfolio had a cost-benefit ratio that was higher than the Company has estimated for its 2019 portfolio.

According to its own projections, the Company will fall short of the five-year cumulative energy savings required by the Merger Settlement. If CCL and SACE instead only considered DEP's savings to non-opt-out customers in South Carolina, the Company's performance in 2017 improves to 1.48% of prior-year retail sales, highlighting the importance of better serving non-residential customers and reducing the number of opt outs.¹⁹

C. DEP Continues to Rely too heavily on lighting and behavioral programs and is not accurately accounting for the savings for those programs

Despite our overall support of DEP's application, SACE and CCL remain concerned with the composition of DEP's energy-efficiency portfolio. DEP places too much emphasis on programs that deliver only very short-lived savings. More than half (55%) of DEP's residential annual savings and nearly a third (31%) of its total portfolio savings in 2019 are forecast to come from DEP's My Home Efficiency Report ("MyHER") program – a behavioral program with short-lived savings, which generally provides less economic value to participating customers as well as the grid.

While relying too heavily on short-lived measures like MyHER, the Company insufficiently promotes the long-lived major measures and comprehensive treatment of buildings. The Residential Home Energy Improvement Program, through which DEP

Carolina. Adjusted for 5.10% line losses (DEP response to SACE 1-9), the South Carolina savings are about 53 GWh.

¹⁹ DEP reported 2,731 GWh of retail sales to opt-out customers and 3,889 GWh of sales to non-opt-out customers in 2016 in Docket No. 2017-245-E, Exhibit 5 at 3, 4.

promotes long-lived measures such as heat pumps, central air conditioners, heat pump water heaters, attic insulation, and duct sealing, is only forecast to produce roughly 1.2% of DEP's total savings in 2019.²⁰ As set forth in more detail below, the Company lags behind its peers when it comes to investments in longer-lived measures.

Further, DEP is also forecasting a large fraction of other savings to come from residential light savings. Most of these residential light savings will not persist past 2020 because of the baseline shift resulting from the 2020 federal EISA efficiency standards. The Company should continue to look for ways to use its entry-level behavior and lighting programs to drive customer demand for more comprehensive retrofits and deeper long-term savings.

- i. *DEP's 2017 savings were driven by behavioral and lighting programs, which could compromise future savings growth.*

DEP's level of residential energy savings in 2017 was driven largely by the MyHER behavioral program, which delivered roughly 54% of the Company's total residential energy savings and about 30% of total savings in 2017. The Company forecasts that 55% of its residential annual savings and 31% of its total forecast 2019 incremental annual savings will come from its Residential My Home Energy Report behavioral program.²¹

Savings from behavioral programs do not produce the same kinds of deep and long-lasting savings that can be achieved from more comprehensive retrofit programs (though as discussed below, savings from MyHER likely persist in ways not accounted for by DEP). CCL and SACE again recommend that the Company use the MyHER

²⁰ DEP Application, Exhibit 7.

²¹ DEP Application, Exhibit 7.

program as an opportunity to attract customers to other EE and DSM programs that can achieve deeper and longer-lasting savings.

Data from the American Council for an Energy Efficient Economy's (ACEEE's) 2017 Utility Energy Efficiency Scorecard, which rated the efficiency performance of 51 utilities across the country, also suggest that the average savings life of DEP's efficiency programs is much lower than average. Specifically, though DEP's average *annual* savings was only just below average for the 51 utilities analyzed, its average *lifetime* savings was only about half of the average lifetime savings achieved by those 51 utilities.²²

CCL and SACE are unaware of any other investor-owned electric utility (other than DEP's affiliated company, Duke Ohio) that is planning to get that much of its total savings from a residential behavior program. To illustrate this point, Chris Neme of the Energy Futures Group compiled estimates of the percentage of both residential and total savings that residential-behavior programs provide for 19 electric utilities in the eastern half of the United States, including nine Southern utilities. Though not an exhaustive review, it includes data for the largest utilities in most Southern, mid-Atlantic, and Midwestern states. Those estimates are provided in Table 4 below.

²² Relf, Grace et al., 2017 Utility Energy Efficiency Scorecard, ACEEE Report U1707, June 2017.

Table 4. Percentage of Total Savings from Residential Behavior Programs²³ -

Utility	State	Plan or Actual	Year	MWh Savings			Behavior Savings %	
				Res. Behavior Program	All Res. Sector Programs	All Programs, All Sectors	% of Res. Sector Savings	% of Total Savings (All Sectors)
Duke Energy Progress	NC/SC	Plan	2019	119,273	217,997	384,711	55%	31%
Entergy New Orleans	LA	Plan	2019	8,000	19,416	53,894	41%	15%
Entergy Gulf States	LA	Actual	2017	0	10,419	17,057	0%	0%
Entergy Louisiana	LA	Actual	2017	0	18,101	28,456	0%	0%
Entergy Mississippi	MS	Actual	2017	0	13,227	26,294	0%	0%
Mississippi Power	MS	Actual	2017	3,421	7,611	18,333	45%	19%
Entergy Arkansas	AR	Actual	2017	7,901	104,051	264,992	8%	3%
SWEPCO	AR	Actual	2017	0	12,617	33,667	0%	0%
Georgia Power	GA	Actual	2017	12,366	94,119	375,375	13%	3%
Florida Power and Light	FL	Actual	2017	0	23,600	71,400	0%	0%
PEPCO	MD	Plan	2019	48,710	130,189	262,357	37%	19%
Baltimore Gas & Electric	MD	Plan	2019	138,200	335,267	500,267	41%	28%
PECO	PA	Plan	2016-20	304,999	844,412	2,091,301	36%	15%
All MA Utilities	MA	Actual	2016	140,547	723,392	1,569,661	19%	9%
Commonwealth Edison	IL	Plan	2018	275,502	575,606	1,619,028	48%	17%
Ameren Illinois	IL	Plan	2018	6,290	92,971	347,176	7%	2%
First Energy	OH	Plan	2017-19	125,788	632,302	1,781,833	20%	7%
American Electric Power	OH	Plan	2019	75,000	212,600	611,500	35%	12%
DTE	MI	Plan	2019	73,668	291,013	702,850	25%	10%
Consumers Energy	MI	Plan	2019	31,442	157,846	479,471	20%	7%
Avg of non-Duke Utilities								
Other Southern Utilities							12%	4%
All Utilities							21%	9%

Where possible, Table 4 provides planned numbers to compare to DEP's plan for 2019; otherwise the table provides actual performance numbers for a recent year (mostly 2017). Only one of these utilities comes close to achieving as large a portion of total electric portfolio savings from its Residential Behavior programs as does DEP, which projects that 30% of its overall savings in 2019 will come from the My Home Energy Report program. In fact, the average non-DEP utility is getting only 9% of total portfolio electric savings from its residential behavior programs – less than one-quarter as much as DEP – and the average of the other southern utilities for which data were obtained is even

²³ All values are from publicly available sources, either filed utility plans or utility annual reports. Specific references are available upon request.

less. Only one utility – Baltimore Gas & Electric – is planning to get nearly as much of its savings from its Residential Behavior program as DEP.²⁴

This circumstance leaves DEP in need of other measures or programs to make up the shortfall caused by the overstatement of savings from MyHER to meet or exceed the 1.0% of prior year sales target that DEP already plans to fall short of absent any adjustments. The idea that DEP's already sub-target portfolio performance might in actuality be even worse than assessed makes the need for adjustments even greater.

D. Untapped Potential for cost-effective savings that DEP's Programs are not reaching

As in previous years, the high rate of non-residential customers opting out of DEP's DSM/EE programs and rider continued. The percentage of DEP's non-residential customers who have chosen to opt out of the Company's DSM and EE programs and rider has increased over time. In 2014, the Company reported that 2,676—or 54%—of its non-residential sales were to customers that had opted out of DEP's DSM programs.²⁵ That figure is projected to be 64% in 2019.²⁶

With customers that account for over 60% of DEP's non-residential sales opting out of the Company's DSM and EE programs, it is imperative that DEP adopt new strategies and programs to reverse the trend of increasing opt-outs and grow its non-residential energy savings. The Collaborative would be a good venue for developing new strategies for reaching opt-out customers. On the other hand, this level of opt-outs

²⁴ The 28% provided in Table 4 for BG&E includes only efficiency programs designed to promote efficiency actions by customers. BG&E also gets significant customer savings, from conservation voltage regulation (CVR), that were not included in the total savings into which their total residential-behavior program savings were divided. If CVR savings were included, the BG&E average would drop to 21%.

²⁵ Docket No. 2015-323-E, Miller Exhibit 4 at 1.

²⁶ DEP Application, Exhibit 6 (showing that in 2019, the Company anticipates total non-residential, no-lighting sales of 4,264 GWh, and that 2,724, or 64%, of those sales will be to customers who opt out of EE programs (and the same percentage would opt out of DSM programs)).

provides an opportunity for DEP to focus on the still-significant percentage of industrial load that has not opted out and to work with those customers to strengthen its tailored offerings for those customers.

Industrial programs yield very cost-effective energy savings: the levelized cost of saved energy is generally less than three cents per kilowatt-hour (and often less than two cents/kWh).²⁷ Utility investments in DSM and EE that pass cost-effectiveness screening can offset the cost of more expensive supply-side investments, thereby reducing total utility revenue requirements. Such investments have the effect of lowering costs for all customers in the medium and long term, regardless of whether they directly participate in the efficiency programs. As noted on Table 2 above, DEP's DSM and EE programs have consistently achieved hundreds of millions of dollars of savings each year, which yield financial benefits to all customers. Were it not for these capacity and energy savings, customers would have to pay considerably more to provide equivalent power through traditional supply resources.²⁸

DEP's efficiency potential is overwhelmingly located in the non-residential sector. According to Nexant's 2016 study, the industrial sector, even taking current opt-out rates into account, represents 25% of the achievable program potential, and the commercial sector represents 40% under the enhanced scenario.²⁹ CCL and SACE recommend that DEP work with stakeholders to develop new strategies for overcoming

²⁷ SEE Action Network, Industrial Energy Efficiency and Combined Heat and Power Working Group, "Saving Energy in Industrial Companies: Case Studies of Energy Efficiency Programs in Large U.S. Industrial Corporations and the Role of Ratepayer-Funded Support," March 2017.

²⁸ DEP response to CCL-SACE DR 1-3am workbook: CCL-SACE DR1-3b.xlsx

²⁹ Nexant Study at 93, Figure 7-5. To incorporate the impact of opt-outs into the study, Nexant incorporated the current opt-out information for South Carolina into the model by reducing the non-residential sales estimates by the appropriate percentage for each service territory and applying the applicable energy-efficiency technologies and market adoption rates to the remaining sales forecast.

the financial, regulatory, and informational barriers associated with commercial and industrial investment in EE in order to capture this large energy savings opportunity.

DEP should assess the potential to reduce the number of customers who opt out of its programs by improving business customers' understanding of its programs and/or improving the designs of its programs to make them more attractive to such customers. Business customers opt out of efficiency-program offerings (when they have the option) for a variety of reasons. Some of those reasons are outside the control of the utility. Others are not. For example, some business customers opt out because they do not feel that the utility's efficiency-program offerings adequately address their needs. Sometimes this feeling is a function of the business customer not fully understanding the efficiency programs that the utility offers. Other times, business customers have legitimate concerns about the structure and nature of available program designs. If DEP could improve awareness of how its programs can help business customers while also improving its offerings to better serve customers that are otherwise inclined to opt out, the Company could tap into another source of substantial energy savings. Many of these savings would likely be long-lived and very cost-effective and would further reduce the amount of more expensive supply-side resources the Company would need to procure.

Improved engagement with this class of customers may need to take on a new, tiered approach. For larger industrial customers, the role of DSM/EE programs is usually to assist companies in the rollout and expanded operation of their own programs in different facilities. For medium- and small-scale companies, DEP should look to create EE programs that can offer technical assistance and in some cases, provide financing assistance to overcome time, capacity and capital hurdles. Comprehensive, continuous

improvement energy-management process programs like Strategic Energy Management can increase industrial staff capacity and reduce the upfront costs of participation in utility programs. CCL and SACE strongly support a renewed focus on this energy-intensive group of customers and stand ready to work with the Company to help it achieve its energy-savings potential from the non-residential sector.

- i. DEP should reevaluate its assumptions about persistent savings from its My Home Energy Report.*

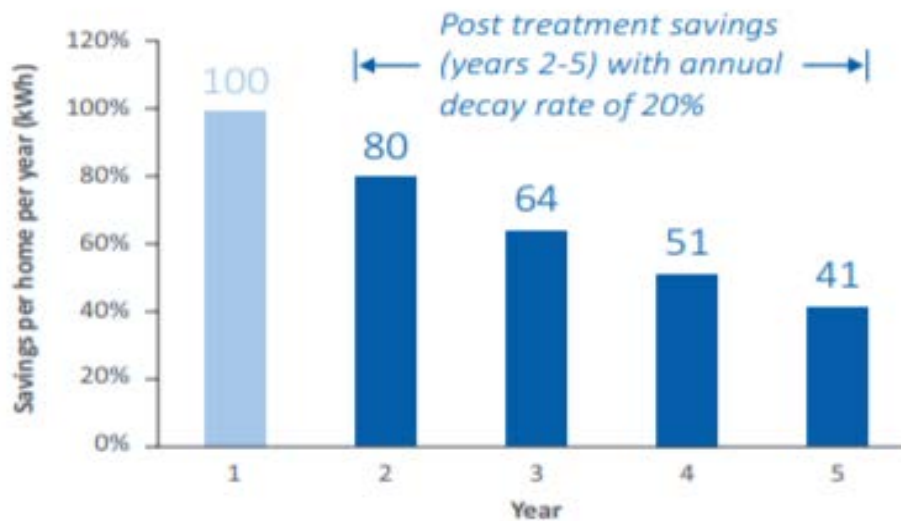
DEP assumes that the savings from the My Home Energy Report last only for as long as participants are receiving the report.³⁰ This assumption leads the Company to conclude that it must provide MyHER mailings to the same customers who received them over the prior year in order to reacquire savings procured from those customers over the previous year. In other words, DEP wrongly assumes that savings expire as soon as customers stop receiving the My Home Energy Reports. As a result, each year, DEP counts the savings from all program participants, regardless of the year in which they started participating, as part of its estimates of the *new* annual savings it is producing each year.

But it is not reasonable to assume that savings vanish immediately once someone stops receiving the reports. A number of studies of residential behavior programs have shown that savings produced from a given year of program delivery do not expire if the program is stopped. Instead, a significant portion of the savings will persist into the years following program termination, though the amount that persist declines over the course of several years. One commonly referenced study suggests that, on average, savings achieved during a program year decay (or decline) by about 20% every year following

³⁰ DEP Response to SACE DR item 1-14.

program termination.³¹ As the figure on the following page illustrates, that would mean that 80% of the program-year savings persist into the first year following termination of the program, 64% persist into the second year, 51% persist into the third year, and so on.

Cadmus Report, Figure 3: Home Energy Report Savings Persistence with 20 Percent Annual Decay Rate³²



As a result, some states have adjusted the way that they estimate savings from such residential behavioral programs. For example, the Illinois TRM now requires electric utilities in the state to assume that 80% of savings achieved in a program-participation year persist into the first year following program termination, 54% into the second year, 31% into the third year, and 15% into the fourth year.³³ Thus, if a utility measures annual savings of 100 kWh per participating customer each year, it can only

³¹ Khawaja, Sami and James Stewart, Long-Run Savings and Cost-Effectiveness of Home Energy Report Programs, published by The Cadmus Group, Inc., Winter 2014/2015 (http://www.cadmusgroup.com/wp-content/uploads/2014/11/Cadmus_Home_Energy_Reports_Winter2014.pdf) (“Cadmus Report”).

³² This is a copy of Figure 3 from the Cadmus Report, *supra* note 33.

³³ Illinois TRM Version 6.0, Volume 4, p. 9 (http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_4_X-Cutting_Measures_and_Attach_020817_Final.pdf).

claim 20 kWh of *new* incremental annual savings in the second consecutive year of delivery to the same set of customers.³⁴

Taking into account this persistence of savings should inform delivery strategies for the My Home Energy Report program. First, it significantly reduces the amount of *new* annual savings a utility can count from repeat participants towards any annual savings goals. And because the cost of the program per participant does not change, the cost per unit of *new* annual savings from repeat participants goes up considerably. That, in turn, at least has the potential to make program delivery to repeat participants comparatively more expensive per new annual kWh saved than other programs to which efficiency portfolio budgets can be allocated. Second, it can even render it not cost-effective to deliver the program to repeat participants.

As a result, it may make sense to adjust program design and delivery strategy. One option is to rotate delivery of residential behavior programs to different sets of customers each year, and not return to a group of customers until at least three or four years have passed since they were last treated. That is the strategy that Ameren Illinois has adopted for its 2018-2021 plan. There are undoubtedly other options that merit consideration as well.

Before making programmatic changes, more analysis should be done. It may be appropriate to stop delivering the program for a set of participants, and evaluate savings persistence over time for those participants, in order to refine any changes in assumptions. Finally, it will be important to consider whether and to what extent any

³⁴ Unless savings per customer increase, as they sometimes do after more than one year of participation. For example, if average savings per customer were 100 kWh in the first year and grew to 120 kWh in the second year, the utility could claim 40 kWh of new incremental annual savings per repeat participant, or the difference between the 120 kWh measured in the second year and the 80 kWh that would have persisted into the second year anyway, even if the program was not offered again to the same customers.

changes in assumptions regarding the life of a measure – as well as other concerns discussed further below – support changes to program emphasis and delivery strategy. This is an issue that the Public Service Commission may wish to refer to the DEP Collaborative for discussion, analysis, and ultimately recommendations on how to proceed.

ii. *Federal EISA standards will affect residential light bulb savings life.*

The evaluation report for DEP's Free LED program assumes that most LED light bulbs have an average life of about 20 years.³⁵ 20 years appears to be an optimistic assumption, even for the technical life of an LED light bulb. Most jurisdictions assume somewhere between 10 and 15 years. That is also consistent with the Energy Star requirement for minimum hours of use for the most common LEDs (15,000)³⁶ and DEP's most recent evaluation estimate of average daily hours of use of LEDs (2.88 hours³⁷).³⁸ Moreover, Duke Energy Carolinas typically assumes 12 years equipment life for LED bulbs.

Regardless of the appropriate equipment life, 20 years is certainly not a reasonable assumption for the average *savings life*. Put another way, multiplying the first-year savings of a standard LED by its assumed 20-year measure life will produce an unrealistically high estimate of lifetime savings for the measure.

³⁵ Response to SACE DR Item 1-13. A 12-year life is the assumption for between 85% and 90% of the light bulbs DEP is forecasting for its 2019 Residential Energy Efficient Appliances and Devices program in North Carolina. The remaining bulbs have an assumed measure-life of 15 years (DEP confidential response to SACE et al Data Request 2-3b). Though the underlying data source for this analysis was from a spreadsheet marked "confidential" by DEP, counsel for the Company has confirmed that no confidential material is included in this summary of the average useful life of lighting measures.

³⁶ https://www.energystar.gov/products/lighting_fans/light_bulbs/key_product_criteria

³⁷ DEP DSM/EE Application, NCUC Docket No. E-2, Sub 1174, Evans Exhibit H.

³⁸ At 2.88 hours of use per day, the average LED purchased through DEP's residential lighting program will be used 1052 hours per year. Thus, a product meeting the Energy Star minimum criteria would last about 14 years (15,000 hours life divided by 1052 hours of use per year).

An LED light bulb that is purchased today – or next year – is assumed to be purchased instead of a halogen light bulb. The electricity savings produced by an LED in its first year of operation will therefore be equal to the difference between its electricity consumption and that of the halogen that would have otherwise been purchased and installed. In addition to consuming less energy, LEDs last a lot longer than halogens.

In contrast, halogens that are replaced by LEDs typically last only a year or two.³⁹ Thus, in the baseline scenario, the customer would be buying a new light bulb roughly every year or every other year, for as long as the baseline product remains a halogen bulb. If it were reasonable to assume that the baseline product would remain a halogen bulb for the next 20 years, the savings in each of the next 20 years of the LED equipment life would be the same as in the first year. In that case, the LED savings life would be equal to the LED equipment life.

But that is not a reasonable assumption for standard LEDs, because federal efficiency standards under the Energy Independence and Security Act (EISA) that will go into effect in 2020 will effectively require all new general service, screw-based lamps – i.e., those that “standard LEDs” would replace – to be as efficient as compact fluorescent light bulbs (CFLs). Thus, the annual savings estimated for standard LEDs will decline significantly starting in 2020. Put another way, rather than assuming that the current annual savings of an LED will last 20 years (or 12 years), the annual savings for an LED installed in 2017 should only be assumed to continue at the 2017 level for three or four years, followed by additional years of much lower levels of savings.⁴⁰ Similarly, for a

³⁹ Based on review of a variety of screw-based halogen light bulbs for sale from Home Depot (<https://www.homedepot.com/s/halogen%2520light%2520bulb?NCNI-5>).

⁴⁰ Similarly, for a standard LED installed in 2019, the current annual savings estimate would be appropriate for only one or two years, followed by 10 or 11 years of much lower levels of savings. And the savings for

standard LED light bulb installed in 2019, the current annual savings estimate may be appropriate for only the first year or two of the LED bulb's physical life, with lower savings assumed for the remaining reasonable estimation of the equipment life of the bulb.

But recalculating estimated annual savings in this way is only appropriate for the kinds of light bulbs that are governed by the EISA product-efficiency standards, which include all "standard LEDs," particularly "A-Line LEDs," but also likely directional and decorative lamps that are included in a recently expanded definition of "general service lamp" adopted by the U.S. Department of Energy. DEP's programs may include savings from both LEDs that are covered by EISA and LEDs that are not. The savings from the LEDs not covered by EISA would be unaffected by the shifting baseline efficiency associated with EISA. It appears that all of the bulbs proposed to be promoted in 2019 through its Residential Energy Efficient Appliances and Devices program will be affected by EISA.⁴¹

Changing how savings are calculated is consistent with national best practices. This kind of adjustment has been recommended by the national "Uniform Methods Project," a national effort designed to bring consistent best practices to energy-savings estimation and evaluation:

Bulbs expected to be in use in 2020 and beyond will be affected by the EISA backstop provision mentioned in Section 1. The life cycle savings of CFLs, therefore, should either terminate for any remaining years in the expected life beginning in mid-2020, or be substantially reduced after

any standard LED installed in 2020 or later will be much smaller in every year of its operation (i.e., requiring a lower first-year savings value as well as lower savings in subsequent years).

⁴¹ This assumption is based on a review of product types listed in DEP's Excel attachment to its confidential response to SACE 2-3b.

2020 to account for the backstop provision. Similarly, the life cycle savings for LEDs should incorporate this upcoming baseline change.⁴²

Other states, including Illinois and Arkansas, are beginning to make these savings adjustments for standard bulbs. The Illinois TRM explains the LED “mid-life baseline adjustment” as follows:

During the lifetime of a standard Omnidirectional LED, the baseline incandescent/halogen bulb would need to be replaced multiple times. Since the baseline bulb changes over time (except for <300 and >2600+ lumen lamps) the annual savings claim must be reduced within the life of the measure to account for this baseline shift. For example, for 60W equivalent bulbs installed in 2014, the full savings ... should be claimed for the first six years, but a reduced annual savings (...[initial first year energy savings] ... multiplied by the adjustment factor in the table below) claimed for the remainder of the measure life

Minimum Lumens	Maximum Lumens	LED Wattage (WattsEE)	Delta Watts 2014-2019 (WattsEE)	Delta Watts Post 2020 (WattsEE)	Mid Life adjustment(made from June 2020) to first-year savings
1490	2600	37.2	34.8	8.3	23.8%
1050	1489	23.1	29.9	5.1	17.1%
750	1049	16.4	26.6	3.6	13.5%
310	749	9.6	19.4	2.1	10.8%

Source: Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 5.0, Volume 3: Residential Measures, Final; February 11th, 2016; effective June 1st, 2016; p. 261.⁴³

As is evident from the table above, the portion of initial LED savings that no longer apply after 2020 varies by lamp light output level. The average remaining savings across

⁴² Dimetrosky, Scott, Katie Parkinson and Noah Lieb, “Chapter 21: Residential Lighting Evaluation Protocol,” The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, published by the National Renewable Energy Laboratory, February 2015, <http://energy.gov/sites/prod/files/2015/02/f19/UMPChapter21-residential-lighting-evaluation-protocol.pdf>.

⁴³ http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_5/Final/IL-TRM_Effective_060116_v5.0_Vol_3_Res_021116_Final.pdf.

the four categories shown is 16%, representing an 84% reduction from pre-2020 annual savings levels.

The Arkansas TRM uses the same conceptual approach, but with slightly different assumptions. Specifically, it assumes that the baseline shift for standard LEDs does not change until 2022 instead of after 2020, so it assumes that there are more years of higher levels of savings and fewer years of lower levels of savings.⁴⁴ That difference is a function of different assumptions regarding the average life of a current baseline halogen lamp.

The EISA-driven baseline shift, by definition, does not affect estimated first-year savings from LEDs, at least not until 2020, when the prohibition on sale of products not meeting EISA standards goes into effect. However, because it affects estimated savings for a significant portion of the assumed physical life of the average LED governed by such standards, it will reduce estimates of the net economic benefits of such light bulbs.

These new efficiency standards do not require an adjustment to DEP's application in this proceeding. There are several issues that should be worked out in detail before making adjustments to DEP's economic net-benefit calculations, including the nature of the specific baseline shifts to be made, assumptions regarding the products for which they should be made,⁴⁵ assumptions regarding the assumed life of the average halogen baseline lamp being displaced today (the longer the halogen life, the longer the average period before the baseline shift occurs), etc.

⁴⁴ Arkansas Public Service Commission, Arkansas Technical Reference Manual, Version 7.0, Approved in Docket 10-100-R, filed 8/31/2017 (<http://www.apscservices.info/EEInfo/TRMv7.0.pdf>).

⁴⁵ The U.S. Department of Energy's expanded definition of general service lamp is being challenged by some parties. While it appears likely to withstand such challenges, it may be appropriate to assess that likelihood thoroughly before making definitive DEPisions regarding the products for which adjustments should be made.

Regardless, this is an important issue for a measure that accounts for a significant portion of DEP's estimated annual savings. Thus, as with the issue of the My Home Energy Report program savings decay/persistence, the Public Service Commission should consider referring this issue to the combined DEP-DEC Collaborative for discussion, analysis, and ultimately recommendations on how to proceed.

iii. DEP should offer new and enhanced residential programs.

To increase savings, DEP should expand and enhance existing programs, develop new programs, and target customer segments that remain relatively untapped.

Specifically, CCL and SACE make the following recommendations:

a. Increase participation in existing rebate programs.

DEP should significantly increase the number of customers participating in rebate offers for high-efficiency heat pumps, central air conditioners, heat-pump water heaters, pool pumps, attic insulation, air sealing, and duct sealing. There should be significant savings potential from these measures as they address the largest electricity end-uses in homes.

However, DEP's Home Energy Improvement Program – the program through which all of these residential measures are promoted – is forecast to produce only about 1% of the Company's annual residential savings in 2019. Participation rates for these measures could potentially be increased in a variety of ways. In short, though DEP includes many of the major residential measures with big savings potential in its program, investment and participation in those measures fall far below potential and greatly limit total savings achieved by the portfolio.

Perhaps most notably, they could be dramatically increased by moving some of the measure incentives (e.g., those for heat pumps, central air conditioners, and heat pump water heaters) upstream to distributors, as the Company has recently done for a number of non-residential prescriptive incentives. Utilities that have made such transitions have achieved dramatic increases in participation. For example, United Illuminating in Connecticut saw a more than six-fold increase in participation in its heat pump water heater rebates when it moved rebates upstream to distributors.⁴⁶ Changes in rebate levels, marketing strategies, paperwork requirements, options for financing investments (for example, through on-bill financing), and/or other program elements may also boost participation.

In addition, the Company could increase longer-lived savings through greater promotion of whole-building retrofits, for residential and, potentially, small business customers too. Such whole-building retrofits should include both (A) improvements to building envelopes (e.g. insulation and air-leakage reduction), and (B) retrofitting efficient heat pumps in single-family and multi-family homes currently using inefficient electric-resistance heat. There may be a large number of such inefficient electrically heated housing units.⁴⁷ The energy savings from these measures have the dual benefit of providing lasting reductions to both summer and winter peaks on the utility system.

⁴⁶ Jennifer Parsons (UI, SCG and CNG), “Energize Connecticut Upstream Residential HVAC Program,” presented at the 2015 ACEEE National Conference on Energy Efficiency as a Resource in Little Rock, Arkansas, September 2015.
http://aceee.org/sites/default/files/pdf/conferences/ee/2015/Jennifer_Parsons_Session4A_EER15_9.22.15.pdf.

⁴⁷ Statistics specific to DEP’s North Carolina service territory are not available. However, 62% of North Carolina homes use electricity as their primary heating fuel [U.S. Census, Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates, <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>]. Census data also suggest that more than half of electrically heated homes in the South Atlantic region rely upon some form of electric-resistance heating system, whether a furnace, electric baseboard, or portable electric heaters

- b. A comprehensive home energy retrofit program based on industry best practices would deepen savings.

A well-performing, comprehensive, home-energy-retrofit program often delivers average electricity usage reductions of 20% or more per home, helping customers reduce bills. Absent such a program, customers are unlikely to undertake comprehensive home retrofits due to high upfront costs, information barriers, and time constraints, even where such retrofits are cost-effective. These programs can deliver deep, long-term energy savings and benefits, including substantial cost savings, increased comfort, better indoor air quality, and overall customer satisfaction.

Whole-home retrofit programs have proven successful for DEP's peers in other Southern states. Arkansas provides a notable example. In 2015, Southwestern Electric Power Company ("SWEPCO") achieved 19% of its efficiency portfolio savings in Arkansas from comprehensive, residential home-energy-services programs, including a highly cost-effective Home Performance with Energy Star ("HPwES") program.⁴⁸ In 2015 and 2016, SWEPCO garnered national recognition as a leading HPwES program manager. Likewise, Arkansas' largest utility, Entergy Arkansas, Inc., achieved 10% of its entire 2015 efficiency portfolio savings through its residential Home Energy Solutions program, which provides diagnostic testing, air sealing, duct sealing, insulation, and HVAC measures.⁴⁹

(U.S. Energy Information Administration, Residential Energy Consumption Survey, Table HC6.8: "Space heating in homes in the South and West Regions, 2015," <https://www.eia.gov/consumption/residential/data/2015/#sh>).

⁴⁸ SWEPCO's HPwES program had a UCT score of 2.10 and a TRC score of 1.26 in 2015. SWEPCO Energy Efficiency Program Portfolio Annual Report and Workbook, Program Year 2015, <http://www.apscservices.info/eeAnnualReports.aspx>.

⁴⁹ The program UCT score was 1.74, and the TRC score was 2.44. Entergy Arkansas Energy Efficiency Program Portfolio Annual Report and Workbook, Program Year 2015, <http://www.apscservices.info/eeAnnualReports.aspx>.

Entergy Arkansas did require some time to get its whole-home efficiency program off the ground. The utility tried different rebate and contractor-management approaches, but did not abandon the effort, and today services more than 3,000 homes annually, achieving \$5 million to \$10 million in net benefits each year.⁵⁰ Beyond the immediate cost savings for utility purposes, the presence of substantial, successful whole-home efficiency programs for the largest utilities in Arkansas has developed a robust market of skilled home-energy professionals who advance home performance statewide.

Successful whole-home retrofit programs have also used on-bill financing as a mechanism to address the upfront cost of major efficiency upgrades. These include the Help My House! pilot program implemented by the Electric Cooperatives of South Carolina, the Roanoke Electric Upgrade to \$ave program, and the HELP Pay-As-You-Save (“PAYS®”) program at Ouachita Electric in Arkansas.

Tariffed on-bill financing programs, such as HELP PAYS® and Upgrade to \$ave, have also met the needs of low-income customers, because the utility covers the upfront costs of the efficiency upgrades and the program is designed to save customers money on their electric bills at the outset. In addition, unlike other whole-home retrofit programs, tariffed on-bill financing can serve renters as well as owner-occupiers. Such programs increase the total number of customers able to participate and address equity issues for low-income customers who pay for efficiency programs through their monthly bills but may otherwise be unable to benefit from direct participation. We recommend that DEP continue to work with the Collaborative to develop on-bill programs for residential and

⁵⁰ Entergy Arkansas Energy Efficiency Program Portfolio Annual Report and Workbook, Program Year 2013-2015, available at <http://www.apscservices.info/eeAnnualReports.aspx>.

non-residential customers as a means to encourage comprehensive home and commercial building retrofits.

- c. Additional low-income EE programs would ease the energy burden on low-income customers while improving comfort, safety and health.

It is important for DEP's energy-efficiency portfolio to include an expanded focus on low-income customers, who are generally less likely to participate in programs marketed to the residential sector as a whole. Such programs usually offer financial incentives to defray, but not totally eliminate, the incremental cost of efficiency measures. Low-income customers rarely have the financial means to make any contribution to efficiency-measure costs. Many are renters, and therefore face greater barriers to participation in efficiency programs than do home owners.

Second, low-income customers need energy-efficiency improvements more than other customers, because they must spend a much higher portion of their income on energy than do non-low-income customers. In addition, because of their limited means, paying their energy bills can force trade-offs with other necessities of life, like food and health care.

Robust EE programs for low- and fixed-income households are essential to ensure that all customers are able to afford basic utility service. According to a 2016 Home Energy Affordability Gap study, there are about 143,600 South Carolina households with an income less than 50% of the Federal Poverty Level ("FPL"). These households spend on average a staggering 25% of their income on energy bills—a far greater percentage than those households at 185 to 200% of the FPL, who spend an average of 5% of their

income on energy.⁵¹ And about 172,500 additional South Carolina households live with incomes between 50% and 100% of the FPL and spend approximately 13% of their income on energy.⁵²

DEP's only program specifically marketed to low-income customers, the Neighborhood Energy Saver Program, achieved 2.2 GWh of savings in 2017, or only 0.53% of DEP's total EE portfolio savings. DEP only devoted approximately 3.5% of its 2017 residential energy-efficiency spending on the program. That amount is only forecasted to barely increase to 4.0% in 2019.⁵³ More should be done for low-income customers.

The Neighborhood Energy Savings program is targeted to neighborhoods where at least half of the households have income levels at or below 200% of the Federal Poverty Guideline.⁵⁴ While CCL and SACE do not have data specific to just DEP's service territory, 32% of South Carolina households have incomes at that level.⁵⁵ Thus, if statewide poverty levels are a reasonable proxy for poverty levels in DEP's service territory, the size of the target market is more than seven times the portion of residential program spending being devoted to it.⁵⁶

Although all DEP residential customers contribute to the DSM/EE rider and benefit from system-wide savings, low-income customers receive a disproportionately lower share of direct benefits from program participation than non-low income

⁵¹ Fischer, Sheehan and Colton, 2017 Home Energy Affordability Gap, http://www.homeenergyaffordabilitygap.com/03a_affordabilityData.html.

⁵² Id.

⁵³ DEP Application, Ex. 7.

⁵⁴ DEP response to SACE 1-24.

⁵⁵ Kaiser Family Foundation, Distribution of the Total Population by Federal Poverty Level (above and below 200% FPL), <https://www.kff.org/other/state-indicator/population-up-to-200-fpl/>

⁵⁶ And this could be a conservatively low multiplier because DEP's Neighborhood Energy Saver program, though targeted at communities in which at least 50% of households are at or below 200% of the Federal Poverty Guideline, can treat customers in those neighborhoods that have incomes above that threshold.

customers.⁵⁷ Coupled with the weatherization assistance and new appliance portions of the Income Qualified program, there is substantial opportunity for DEP to provide additional energy savings assistance for this vulnerable customer class.

In addition to energy savings, low-income energy-efficiency programs have significant non-energy benefits (“NEBs”), which are often unaccounted for. These benefits include fewer disconnections and arrearages on utility bills; improved health, safety and comfort; increased productivity; environmental benefits; economic development; and job creation. It is essential to recognize NEBs in screening programs for cost-effectiveness, particularly for low-income programs. In order to value all energy savings appropriately, CCL and SACE recommend that DEP work with the Collaborative to develop values for the NEBs associated with low-income programs and to evaluate new programs with this more robust evaluation framework moving forward.

A potential first step is to quantify the cost of involuntary disconnections. According to DEP’s recent filings, over 17,000 accounts in its South Carolina service territory were disconnected for non-payment in 2017 alone.⁵⁸ Because of their financial constraints, low-income households are generally more likely to have problems paying their bills. DEP, like all utilities, incurs costs managing relationships with customers with bill-payment problems. To the extent that low-income efficiency programs can

⁵⁷ Low income customers, like all customers, can still benefit from the effects all of DEP’s programs have on reducing utility system costs. They just cannot benefit as much as others if they cannot participate at levels commensurate with those of non-low income customers.

⁵⁸ DEP, Quarterly Reports on Involuntary Termination of Electric and/or Gas Service, Report for the First Quarter of 2017, Docket No. 2006-193-EG; DEP, Quarterly Reports on Involuntary Termination of Electric and/or Gas Service, Report for the Second Quarter of 2017, Docket No. 2006-193-EG; DEP, Quarterly Reports on Involuntary Termination of Electric and/or Gas Service, Report for the Third Quarter of 2017, Docket No. 2006-193-EG; DEP, Quarterly Reports on Involuntary Termination of Electric and/or Gas Service, Report for the Fourth Quarter of 2017, Docket No. 2006-193-EG.

lower such costs, there are added utility-system benefits that do not accrue to other programs (at least not to the same level).

CCL and SACE also recommend that DEP explore the idea of working with community partners such as the South Carolina Association of Community Economic Development Corporations (“SCACED”) to implement low-income and residential energy-efficiency programs. For example, DEP could enter into program partnerships or arrangements between itself and one or more other energy utilities, local governments and/or community organizations to implement an energy-efficiency program. Partnerships typically identify specific contributions and roles for each of the parties involved that, when applied to the program, may improve program delivery, participation, and energy savings beyond a utility-only program.⁵⁹

For example, a new residential, whole-building retrofit program could be targeted first to electrically heated low-income neighborhoods⁶⁰ and/or offered with a tiered incentive structure, with income-eligible customers receiving the retrofit services for free, when necessary to enable them to participate.⁶¹ Depending on capabilities, relationships, and other factors, such a program could even be delivered on DEP’s behalf by community action agencies (CAAs) that already perform low-income home retrofits using federal and/or state dollars. DEP already has experience with this kind of

⁵⁹ Eric Mackres et al., *The Role of Local Actors as Energy Efficiency Implementation Partners: Case Studies and a Review of Trends*, 3 (2012), <http://www.aceee.org/white-paper/the-role-of-local-actors>.

⁶⁰ Although, for equity reasons, there would be value to targeting such a program offering initially to electrically heated, low-income customers, such a program should ultimately aim to offer all cost-effective opportunities, over time, for all customers, regardless of income.

⁶¹ There can be situations, particularly in the case of multi-family buildings, where it may not be necessary to offer efficiency upgrades for free (e.g., where building owners are paying the energy bills and/or when building owners see enough value in lowering energy costs, reducing turnover rates, etc., that they are willing to bear a portion of the cost).

partnership from its investment in the Helping Home Fund.⁶² Even this investment, while important, falls short of having a significant impact on DEP's spending on its low-income customers in North Carolina, and has yet to reach its South Carolina customers.

CCL and SACE recommend that the Commission direct the Collaborative to analyze the Helping Home Fund for cost-effectiveness and determine whether any aspects of the program could serve as a model for an additional DSM/EE program offering in both North and South Carolina.

There are a variety of other options that could also be considered. Later this year, Commonwealth Edison will launch a pilot program promoting heat-pump retrofits exclusively in electric-resistance-heated, low-income, multi-family buildings in the Chicago area.⁶³ These programs could be models for similar DEP initiatives in the future.

- d. Enhanced multi-family programs could yield big savings in a largely untapped sector.

DEP's existing multi-family program achieved 16.15 GWh of savings in 2017—3.8% of total savings. There is significant room for improvement in this largely untapped market. With more than 148,000 affordable housing units and 271 GWh of maximum achievable potential by 2034 in DEP's North Carolina territory alone,⁶⁴ there is likely significant untapped efficiency potential in South Carolina as well. The Nexant potential study indicates that residential multifamily programs have the potential to reduce summer

⁶² Evaluation of Duke Energy's Helping Home Fund, Advanced Energy (Oct. 15, 2017).

⁶³ Illinois Commerce Commission, Order, Docket 17-0312, September 11, 2017 <https://www.icc.illinois.gov/docket/files.aspx?no=17-0312&docId=256554>.

⁶⁴ Optimal Energy, Final Report: Potential for Energy Savings in Affordable Multifamily Housing (2015), <http://energyefficiencyforall.org/sites/default/files/EEFA%20Potential%20Study.pdf>.

peak demand in South Carolina by up to 18 MW and winter peak demand by up 28.6 MW.⁶⁵

As a general matter, DEP also needs to make more of its program offerings available to renters. In rental properties, including in multi-family buildings where tenants pay the energy bills, there is what is commonly known as a split-incentive problem. Specifically, the party who incurs the costs of making any major investments in building envelop, HVAC, and appliance-efficiency measures – the landlord – is not the party who will see the resulting savings on energy bills – the tenant. Well-designed utility programs can overcome this split-incentive.

By developing a comprehensive multi-family program that goes beyond lighting and water measures, the Company could expand the reach of its efficiency portfolio in a critical housing market. These measures should include Energy Star appliances, weatherization, and upgraded HVAC. In addition, improvements to common areas should be included as part of a multi-family retrofit. Programs like on-bill financing can help overcome the landlord-tenant split incentive. We recommend that DEP discuss this topic in future Collaborative meetings, with particular attention to the needs of the multi-family affordable housing market.

- e. There is significant opportunity to improve the efficiency of manufactured housing in South Carolina.

According to the 2010 U.S. Census, there are more than 360,000 manufactured and mobile homes in South Carolina, many of which were built before 1976, when consistent building codes were put in place. In DEP's North and South Carolina territory, it is estimated that there are almost 220,000 manufactured homes. Although these homes

⁶⁵ Nexant Study, p. 8.

may qualify for some of DEP's DSM and EE programs, the needs of this market are much different from those of single family stick-built homes and require a different skill set from contractors.

Manufactured homes built before 1976 are the least energy-efficient in the United States housing stock and often have leaky ductwork, rotting (or nonexistent) belly board, poor insulation, and inefficient heating appliances. In addition, manufactured homes are a major source of unsubsidized housing for low-income households, which generally have a disproportionality high energy burden and no access to low-cost capital to fund improvements and/or replacement.

Entergy Arkansas is currently running a program weatherizing manufactured homes, 37% of which were occupied by low-income households and another 29% either "likely" to be or "potentially" low-income.⁶⁶ That program had a remarkable 8.56-to-1 TRC benefit-to-cost ratio in 2017.

A multi-tiered manufactured home program could include a variety of solutions to address this energy efficiency need:

1. Replacement program – target pre-1976 homes with an EnergyStar certified replacement.⁶⁷
2. Heat pump replacement program - target homes that are at least 10-15 years old with electric furnace and weatherization as needed. Successful programs have used on-bill financing to assist homeowners with the upfront cost.⁶⁸
3. New manufactured home incentive program - target new home buyers with an incentive to invest in Energy Star manufactured homes.⁶⁹

⁶⁶ Energy Arkansas, Arkansas Energy Efficiency Program Portfolio Annual Report, Docket No. 07-085-TF, 2017 Program Year, May 1, 2018 (<http://www.apscservices.info/EEInfo/EEReports/Entergy%202017.pdf>).

⁶⁷ Examples include New York Mobile and Manufactured Home Replacement Program and the Vermont Housing & Conservation Board (VHCB) Modular Housing Innovation Project (MHIP).

⁶⁸ Examples include French Broad EMC's Mini-Split Heat Pump Program.

⁶⁹ Examples include Grayson Rural Electric Co-op's Manufactured Home Program.

iv. *Improvements to the Collaborative.*

As noted above, CCL and SACE recommend a number of items that the DEP-DEC Collaborative should analyze and review before next year's DSM/EE filing. To achieve those goals, we recommend improvements to the Collaborative to help it function at a higher level. Though we recognize that the Commission cannot effectively order an enhanced working relationship, directing the Collaborative to take some of the concrete steps listed below can foster more cooperation. For example, the Commission could direct DEP to make use of an outside, independent facilitator for the Collaborative. As parties work together under this kind of framework, experience from other states suggests that they can better appreciate other perspectives and are better able to identify compromises that can work for everyone.

- **More frequent meetings:** In order to get substantive work done, the collaborative should meet at least eight to 10 times a year (almost monthly) for larger group discussions, with more numerous sub-group working sessions focused on specific topics (for example, examining and analyzing a particular program design or developing a TRM).
- **Shared agenda-setting:** It is important for all parties to be included in establishing priorities for discussion, including specific meeting agendas.
- **Independent facilitation:** An independent facilitator ensures that all voices are heard, including in setting agendas for meetings, and enables participants in the Collaborative to focus on the topic at hand rather than the actual running of meetings. Outside facilitators have been hired to

manage the collaborative process in Illinois, Arkansas, and Michigan, and has helped to make the work more effective.

- **Institutionalization of working processes:** This starts with simple things like establishing a schedule for meetings and what those meetings will cover; distributing agendas; and distributing meeting notes, summaries of agreements/ disagreements, and lists of next steps. All of these steps must be taken with enough advance notice for parties to be able to prepare and participate in the meetings meaningfully. Over time, more formal processes should be developed (e.g., annual processes for reviewing and updating and documenting savings assumptions – ideally in a TRM).
- **Accountability:** Collaborative groups that function well are expected to produce results and to report back to regulators, increasingly in the form of consensus filings, on progress made on key issues.

CONCLUSION

In conclusion, CCL and SACE generally support DEP's request for approval of Rider 10. But some of its assumptions and program delivery will need to be updated before next year's filing. In particular, DEP should work with the Collaborative to take into account (1) the persistence of savings from the My Home Energy Report for periods of time after participants receive the report, (2) the imminent changes to federal efficiency standards for light bulbs; (3) all relevant benefits in its UCT and TRC cost-effectiveness tests. In addition, CCL and SACE recommend developing a Technical Resource Manual. There still exists tremendous potential for EE in DEP's South Carolina territory, including in vulnerable low-income communities and in the largely

untapped non-residential sector. DEP has not yet laid out plans to tap this EE potential by filling the gaps in its portfolio.

In order for the Company to improve its energy savings, CCL and SACE recommend that the Company work with the Collaborative on new programs based on best practices from around the country, including comprehensive whole-house retrofit programs, an enhanced multi-family affordable housing program, a manufactured housing program, and additional lower-income residential EE programs.

Finally, CCL and SACE recommend specific ways that the Collaborative could run more effectively to accomplish the above recommendations.

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CERTIFICATE OF SERVICE

I certify that the following persons have been served with a copy of the foregoing
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